

CLAIMS

1. Process for the preparation of synthesis gas by catalytic steam and/or CO₂ reforming of a hydrocarbon feedstock comprising the following steps:

(a) heating the reaction mixture of hydrocarbon and steam and/or CO₂ in a heated steam reforming unit integrated with the flue gas containing waste heat section from the fired tubular reformer in which reforming of the reaction mixture takes place by contact with a solid reforming catalyst

(b) feeding the partially steam reformed mixture to the fired tubular reformer and further reforming the mixture to the desired composition and temperature, wherein the heated steam reforming unit comprises a piping system containing reaction sections with solid reforming catalyst comprising catalyst pellets and/or catalysed structured elements, the piping system being part of the process gas piping system integrated with the flue gas-containing waste heat section.

2. Process according to claim 1, wherein the heated steam reforming unit is comprised of heating sections with or without solid reforming catalyst and adiabatic reaction sections containing catalysed structured elements coated with a layer of steam reforming catalyst, both sections being part of the process gas piping system integrated with the flue gas-containing waste heat section.

3. Process according to claim 1, wherein the heated steam reforming unit is comprised of heated, reaction sections with catalyst pellets, the heated sections being part of the process gas piping system integrated with the flue gas-
5 containing waste heat section.

4. Process according to claim 1, wherein the re-action mixture of hydrocarbon and steam and/or CO₂ is pre-reformed prior to heating step (a).

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5. Process according to claim 1, wherein the structured element is a monolith or is cross-corrugated.

15 6. Process according to claim 2, wherein steam and/or carbon dioxide is added to the adiabatic reaction sections.

20 7. Process according to claim 1, wherein the reaction sections also contain steam reforming catalyst attached to the tube wall or catalyst attached to structures attached to the tube wall.

8. Apparatus for the preparation of synthesis gas according to claim 1 comprising the following:

(a) an adiabatic pre-reformer for optional pre-reforming of a mixture of hydrocarbon and steam and/or CO₂

5 (b) a fired tubular reformer with a flue gas-containing waste heat section for heating of a mixture of hydrocarbon and steam and/or CO₂ or of the pre-reformed mixture

10 (c) a heated steam reforming unit integrated with the flue gas containing waste heat section from the fired tubular reformer wherein the heated steam reforming unit comprises a piping system containing reaction sections with solid reforming catalyst comprising catalyst pellets and/or catalysed structured elements, the piping system being part 15 of the process gas piping system integrated with the flue gas-containing waste heat section.

9. Apparatus according to claim 8, wherein solid catalyst is placed in the heated reaction sections and/or in the 20 adiabatic reaction sections of the heated steam reforming unit.